How Much Can Be Read from the Electrocardiogram? Applications of the Solid Angle Theory to the Abnormal ECG Waveforms of Myocardial Infarction

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The concept of the solid angle theory was first conceived in the 1680s by Sir Isaac Newton and in the 19th century was fully developed by Karl F. Gauss and James C. Maxwell to compute the strength and direction of magnetism at any field points away from its source. Subsequently, its applicability to various electrocardiographic waveform abnormalities including those recorded from acute myocardial infarct has been qualitatively and quantitatively validated by many researchers, mostly of the US and Japan.

In this lecture, the solid angle theory will be applied to the following clinically pertinent issues; the ST elevation or depression consisting of two discordant components, i.e. TQ deflection and ST deflection; TQ-ST deflections vs. the size and shape of acute myocardial infarcts; the electrophysical bases for the difference in the ECG waveforms of transmural and subendocardial infarcts, both acute and old; the size of Q wave vs. the size and shape of myocardial infarcts; the electrophysical determinants of the depth and width of infarct Q wave; localizing the infarct borders from precordial ECGs, both acute and old infarcts; electrophysical bases for the evolutionary ECG pattern of myocardial infarction.

Keywords: solid angle theory, myocardial infarction, ST elevation